Claims

1. A fuel injection valve, having a fuel inlet (2), having an excitable actuating device (1, 2, 19) by which a valve closing member (28) is movable, having a fixed valve seat (27) embodied on a valve seat element (26), with which seat the valve closing member (28) cooperates to open and close the valve, having at least one outlet opening (32), as a fuel outlet, provided downstream of the valve seat (27), characterized in that the at least one outlet opening (32), on its ejection end, has an outlet region (75),

- which deviates in shape and/or size and/or contour from the remaining embodiment of outlet opening (32),

- which can be recessed from the side of the outlet opening (32) remote from the valve seat (27), and

- which is contoured in production terms independently of the remaining embodiment of the outlet opening (32).

2. The fuel injection valve of claim 1, characterized in that upstream of the at least one outlet opening (32), a swirl-generating means (47) is provided.

3. The fuel injection valve of claim 1 [or 2], characterized in that the at least one outlet opening (32) is embodied in the valve seat element (26).

4. The fuel injection valve of claim 1 [or 2], characterized in that an ejection region (67) is disposed

downstream of the valve seat element (26), and the at least one outlet opening (32) is embodied in the ejection region (67).

5. The fuel injection valve of [one of the foregoing claims] claim 1, characterized in that the outlet region (75) of the outlet opening (32) is embodied polygonally.

6. The fuel injection valve of [one of claims 1-5] claim 1, characterized in that the outlet region (75) of the outlet opening (32) is embodied as widening or tapering in the form of a truncated pyramid in the flow direction.

7. The fuel injection valve of [one of claims 1-4] claim 1, characterized in that the outlet region (75) of the outlet opening (32) has a circular or elliptical cross section.

8. The fuel injection valve of [one of claims 1-4 or 7] claim 1, characterized in that the outlet region (75) of the outlet opening (32) is embodied as widening or tapering frustoconically in the flow direction.

9. The fuel injection valve of [one of claims 1-4] claim 1, characterized in that the outlet region (75) of the outlet opening (32) is embodied as curved in convex or concave form.

10. The fuel injection valve of [one of the foregoing claims] claim 1, characterized in that the outlet region (75) of the outlet opening (32) has a plurality of portions (75', 75'') in succession in the flow direction, which differ from one another in shape and/or size and/or contour.

11. A method for producing outlet openings in a valve, in particular a fuel injection valve of [one of claims 1-10] claim 1, which has a fuel inlet (2), an excitable actuating device (1, 2, 19) by which a valve closing member (28) is movable, a fixed valve seat (27) embodied on a valve seat element (26), with which seat the valve closing member (28) cooperates for opening and closing the valve, and at least one outlet opening (32), as a fuel outlet, provided downstream of the valve seat (27), characterized in that the at least one outlet opening (32) is produced in such a way that in a first method step, a through hole is created, and in a second method step, from the ejection end of the through hole, an outlet region (75) is created that is varied in shape and/or size and/or contour compared to the through hole.

12. The method of claim 11, characterized in that the through hole is recessed by means of stamping, erosion or laser beam boring.

13. The method of claim 11 [or 12], characterized in that the recessing of the outlet region (75) is effected by a non-metal-cutting production process.

14. The method of claim 13, characterized in that the recessing of the outlet region (75) is effected with a highly focused, high-energy radiation, in particular with electron or laser beams.

15. The method of claim 13, characterized in that the recessing of the outlet region (75) is effected by means of mold wire erosion.

16. The method of [one of claims 11-15] claim 11, characterized in that the through hole created in the first method step has a circular or elliptical cross section.

17. A method for producing outlet openings in a valve, in particular a fuel injection valve of [one of claims 1-10] claim 1, which has a fuel inlet (2), an excitable actuating device (1, 2, 19) by which a valve closing member (28) is movable, a fixed valve seat (27) embodied on a valve seat element (26), with which seat the valve closing member (28) cooperates for opening and closing the valve, and at least one outlet opening (32), as a fuel outlet, provided downstream of the valve seat (27), characterized in that the at least one outlet opening (32) is produced in such a way that in a first method step, a blind bore is created from the inlet-side end opposite the ejection end, and in a second method step, from the ejection end of the outlet opening (32) to be created, an outlet region (75) is created up to the blind bore, far enough to create a continuous outlet opening (32).

18. The method of claim 17, characterized in that the blind bore is recessed by means of erosion or laser beam boring.

19. The method of claim 17 [or 18], characterized in that the recessing of the outlet region (75) is effected by a non-metal-cutting production process.

20. The method of claim 19, characterized in that the recessing of the outlet region (75) is effected with a highly focused, high-energy radiation, in particular with electron or laser beams.

21. The method of claim 19, characterized in that the recessing of the outlet region (75) is effected by means of mold wire erosion.